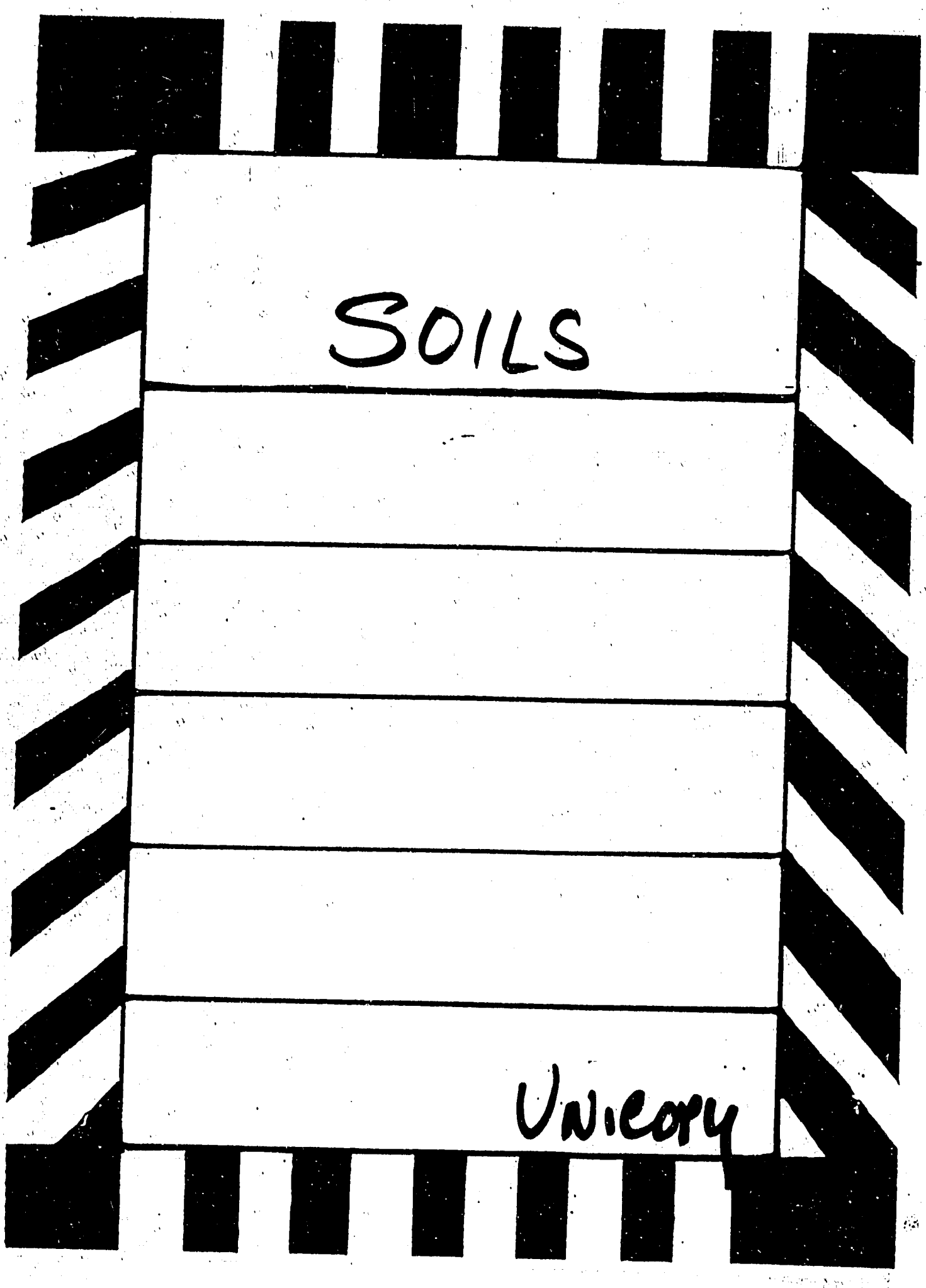
SOILS
UNICORN

GEOTECHNICAL STUDY
PROPOSED COMMERCIAL BUILDING
APN 101-160-015
SE CORNER OF FAIRVIEW PARKWAY
AND HIGHWAY 4
BRENTWOOD, CALIFORNIA
FOR
UNICOPY, INC.
NO. 21-113/6509-01
MARCH 11, 1994

U650901.1

Purcell, Rhoades & Associates

Purcell, Rhoades & Associates

Consultants in the Applied Earth Sciences

1041 Hook Avenue
Pleasant Hill, CA 94523

Tel (510) 932-1177
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No. 21-113/6509-01
March 11, 1994

Mr. Warren Tilbury
Unicopy, Inc.
700 Harvest Park Drive, Unit M
Brentwood, California 94513

Subject: **GEOTECHNICAL STUDY**
Proposed Commercial Building
APN 010-160-015
SE Corner of Fairview Parkway and Highway 4
Brentwood, California

Dear Mr. Tilbury:

As you requested, we have performed a Geotechnical Study for the subject property. The accompanying report presents the results of our exploration, our conclusions, and recommendations. In our opinion, the site is suitable for the proposed development provided the recommendations in this report are incorporated into the design and followed during construction.

The recommendations submitted here are subject to our review of Grading, Drainage and Foundation Plans, observation and testing of grading, and observations of foundation excavation. We reserve the right to submit supplemental recommendations during construction or site development.

If you have any questions, please contact this office.

Very truly yours,

PURCELL, RHOADES & ASSOCIATES

Joseph J. Ambrosino
Associate

Reviewed by:

Daniel J. Rhoades, P.E.
Principal
GE-716, Exp. 6/30/97

REGISTERED PROFESSIONAL ENGINEER
DANIEL JAY RHOADES
No GE-716
Exp. 6/30/97
GEOTECHNICAL
STATE OF CALIFORNIA

DP/lem/U650901.2

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FIGURES

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INTRODUCTION

Purpose

The purpose of this study was to evaluate the foundation soil characteristics relevant to the design of the proposed commercial structure. General foundation engineering design and geotechnical recommendations are provided based on the physical characteristics of the subsurface materials and the geotechnical limitations created by the site's surface features.

Proposed Development

The proposed development consists of one L-shaped commercial building with warehouse and office areas. Two loading docks with depressed ramps and asphalt paved traffic and parking areas for both trucks and autos are to be provided.

The proposed structure is to be a 54,000 square foot "Pre-Engineered Metal Building" on spread footings and a slab-on-grade floor. Thickened slabs may be needed for isolated heavy loads, such as presses.

Structural loads are expected to be relatively light. Since the site is relatively flat, we expect limited earthwork grading will be required to provide the building pad and site drainage. A preliminary site plan for the proposed development was provided by the client.

Please contact our office if the conditions of the project change. We may need to revise our recommendations if changes occur in the configuration of the structure, the type of construction, or the proposed loads.

Scope

The scope of our services for this study included the following:

- Researching soil and geotechnical data,
- Exploring subsurface soil conditions,
- Sampling and laboratory testing of soil encountered in the borings,
- Analyzing the soil data compiled during the exploration,

- Reporting our findings, and
- Providing recommendations for site development.

This study did not include assessments for corrosive or toxic substances, or soil or groundwater contamination. If additional recommendations are required, please contact our office.

Site Location and Description

The site is located at the southeast corner of Fairview Parkway and Highway 4 in Brentwood, California, as shown in Figure 1, Site Location Map. The site is bounded by Fairview Parkway and Highway 4 on the northwest and southwest, respectively, and Main Canal on the southeast. The area around the site is generally used for agriculture, except for some commercial properties to the north. Pipelines operated by Santa Fe Pipelines are reported to be buried along the subject site's south property line on the north side of Main Canal. The site is generally flat and was covered with native grasses and weeds and some scattered trees.

The parcel is nearly level, with an average elevation of approximately 65 feet. The topography of the area generally slopes downward slightly to the north/northeast, based on the USGS, Brentwood Quadrangle. The topography of the site area is shown on Figure 1.

Site History

The rear portion of the subject site was previously occupied by row houses for farm workers. The front portion of site reportedly had some old shacks.

GENERAL GEOLOGIC CONDITIONS

Dibblee (1980) maps the site as underlain by alluvial fan-terrace deposits and a dissected and uplifted large old alluvial fan. Atwater (1982) maps the site as underlain by younger alluvium of Marsh Creek and vicinity.

The subject site lies at the eastern extreme of the outer San Francisco Bay area. Since this region is subject to high seismic activity, the probability of a major earthquake occurring within the economic life of any proposed structure is high.

No active fault trace is known to traverse the subject property and, therefore, the site is not located within an Alquist-Priolo Special Study Zone. The nearest fault designated as active is the Marsh Creek Segment of the Greenville Fault, approximately 9 miles southwest of the subject site. Other active Bay Area faults which could also cause ground shaking at the site include the Concord Fault, approximately 16 miles west; the Calaveras Fault, approximately 18 miles southwest; the Hayward Fault, approximately 27 miles southwest; and the San Andreas Fault, approximately 45 miles southwest of the site.

The Antioch Fault, which is located approximately 2 miles west of the subject site is no longer considered to be an active fault. It may be potentially active. Other faults which are considered to be potentially active lie near the site. These include the Black Diamond Area Faults, the Clayton segment of the Greenville Fault, and the Franklin Fault found approximately 7 miles southwest, 9 miles southwest and 22 miles west of the site, respectively. The Brentwood Fault and the Davis Fault, mapped approximately 2-1/2 miles and 3 miles west and southwest of the site, respectively, are mapped as potentially active according to the *Contra Costa County Seismic Safety Element* (CCCSSE).

The project site would be susceptible to ground shaking during a major earthquake on the San Andreas, Hayward or Calaveras Faults; also, ground shaking may occur during an earthquake on the Concord Fault or the Marsh Creek segment of the Greenville Fault. The seismic risk to a structure depends on the distance from the epicenter; the characteristics of the earthquake; the geologic, groundwater, and soil conditions underlying

the structure and its vicinity; and the nature of the construction. Ground shaking at the site is likely to occur during the life of the project. During a major earthquake, horizontal ground accelerations between 0.10g to 0.25g would be expected at the project site, as indicated in the CCCSSE.

Ground rupture tends to occur along lines of previous fault rupture or tectonic creep. Because no known faults (active or otherwise) cross the site, this hazard is low.

A review of the CCCSSE indicates that the site lies within an area generally considered to have an estimated moderate to high liquefaction potential. Liquefaction potential is discussed in the Subsurface Conditions section.

SITE EXPLORATION AND LABORATORY TESTING

Site Exploration

Field exploration of the site, conducted on February 16, 1994, consisted of drilling three exploratory borings to a maximum depth of about 41.5 feet below the existing grade at the approximate locations shown on Figure 2, Site Plan.

Drilling was performed with a truck-mounted drill rig with 8-inch diameter hollow stem augers. Relatively undisturbed soil samples were recovered in 2.5-inch brass liners in a split tube sampler. Some samples were obtained with a standard penetration test sampler, as indicated on the logs. Logs describing the material encountered in the borings were recorded in the field by a geologist from this office and are shown on Figures 4, 5 and 6.

Laboratory Testing

Laboratory testing was conducted on selected samples to obtain data on density, moisture content, and classification of the soil. Test results are summarized below:

SUMMARY OF LABORATORY TEST RESULTS

Boring	Depth Ft.	Moisture Content %	Dry Density pcf	Plasticity Index	Unconfined Compression, psf
*B-1	2	15	96	20	4,100
B-1	6	17	94		
B-2	2	15	102		2,400
B-2	6	17	95		
**B-3	2	18	109		

*Activity Index = 0.53, 42% Clay sizes
**R-value = 10

SUBSURFACE CONDITIONS

Subsurface Materials

The surficial soils encountered at the three borings included medium dense sandy gravel and medium stiff to stiff sandy silt and clayey silt. Then, Boring B-1 encountered generally stiff to very stiff, silty clay to the termination depth of about 26.5 feet. Under the surficial soil at Boring B-2, varying thicknesses of strata of stiff sandy clay, medium dense clayey sand and stiff silty clay were encountered to a depth of about 23 feet. Then, B-2 encountered dense clayey sand grading to loose to medium dense silty sand to a depth of about 40 feet. The boring terminated in stiff silty clay at a depth of about 41.5 feet. Boring B-3 encountered sandy silt surficial soil underlain by strata of stiff to very stiff silty clay, medium dense silty sand, and stiff silty clay grading to sandy clay to a depth of 11.5 feet.

Groundwater

Groundwater was encountered below depths of about 23 feet and 21 feet at Boring B-1 and B-2, respectively. Groundwater levels would be expected to fluctuate due to variations in rainfall and site conditions.

Liquefaction Potential

Liquefaction occurs when loose, saturated, granular deposits experience substantial strength loss and, subsequently, flow due to increased pore pressure during cyclic seismic loading. Our borings did not reveal the presence of loose, saturated, silty sands that may be susceptible to liquefaction, except between depths of about 25 and 40 feet at Boring B-2 only. However, this layer of sandy soil is confined under clayey soil strata that would not liquefy and was not encountered at Boring B-1 to the termination depth of 26.5 feet. Therefore, it is our opinion, based on the soil conditions encountered in the borings, that the risk of subsidence or ground failure due to liquefaction is considered generally low.

CONCLUSIONS

The following conclusions are based on the results of our study for the proposed development.

1. It is our opinion that development of the project site for the proposed commercial building is feasible from a geotechnical engineering standpoint provided the recommendations contained here are followed.

2. Our subsurface exploration, laboratory testing, and observations indicate that site soil would be generally characterized as low to moderate in expansion potential.

3. It is our opinion that the proposed building may be supported on a foundation system of spread footings. Use of this foundation system is contingent on the grading and foundation recommendations presented in this report.

4. It is our opinion that the risk of subsidence or ground failure due to liquefaction is generally considered to be low at the project site. Confined liquefaction may occur in isolated strata at depth in the event of significant seismic activity.

5. Seismically induced ground shaking should be expected to occur within the economic life of the development, resulting in structural damage. The hazard of seismic shaking is common to the geographic area.

RECOMMENDATIONS

Geotechnical Hazards

In our opinion, based on available data, there are no indications of geotechnical hazards that would preclude use of the site for the proposed development. The proposed structure should be designed to meet current *Uniform Building Code* (UBC) requirements to limit potential damage from ground shaking.

Grading

We anticipate that grading will be minor for this project. Final grading plans were not available during preparation of this report. We recommend that final grading plans be reviewed by our office prior to starting grading. All grading must conform to Appendix A, Recommended Grading Specifications; however, the specifications are general and would be expected to vary with site and soil conditions encountered during development.

All grading should be observed by a representative of our firm. It is especially important that our representative be present during the stripping and scarification process to observe whether undesirable materials are encountered. If loose fill or soft native soils are encountered, subexcavation and recompaction may be required.

On-site soil generated by site grading may be used as fill provided that the soil is free of deleterious and organic materials and that it has been approved for use as fill by the geotechnical engineer. Samples of any proposed import fill planned for use on this project should be submitted to the geotechnical engineer for approval and appropriate testing no less than 4 working days before the expected delivery to the jobsite.

To reduce the potential for heaving of clay soils and to provide more uniform conditions in the building area, we recommend that the upper one to two feet be subexcavated, moisture-conditioned and recompacted to between 88 and 92 percent relative compaction at a minimum of 4 percent over optimum moisture content in accordance with ASTM 1557. This subexcavation and recompaction should extend at least 5 feet outside of the

perimeter of the building. Deeper subexcavation may be required, depending on soil conditions encountered during grading.

Foundations

We understand that the proposed building will be a one-story, pre-engineered metal building. Structural loads for this type of construction are expected to be relatively light. Based upon our Geotechnical Study, we recommend that the proposed structure be supported on spread footings with a slab-on-grade floor.

If a foundation system other than that recommended is desired, this office should be called for supplemental recommendations. Such recommendations will be presented as a supplement to this report. Recommendations for a spread footing foundation are discussed below.

SPREAD FOOTING FOUNDATION DESIGN CRITERIA

Wall Footings (Continuous)	
Width	Minimum 18 inches
Embedment*	Minimum 18 inches
Column Footings (Isolated)	
Width	Minimum 24 inches
Embedment*	Minimum 18 inches
Allowable Bearing Capacity**	2000 pounds per square foot
Coefficient of Sliding Friction	0.30

* Footing embedment depth is measured from the lowest adjacent soil grade to the bottom of the footing.

** The allowable bearing capacity is for dead plus live loads. The bearing capacity may be increased by 1/3 for wind or seismic loads.

The reinforcement of the footings, the thickness of the slab, and the design criteria for stiffening elements should be designed by the project structural engineer.

The excavations for footings should be cleaned of slough and loose material prior to placing steel reinforcement and concrete to reduce the potential for differential settlement. All footing excavations should be observed by a representative from our firm to confirm the competence of the materials in the excavations.

Concrete Slab-on-Grade

Floors

For a foundation consisting of conventional footings, we recommend a concrete slab-on-grade floor. We recommend that the slab-on-grade floor be a minimum thickness of 5 inches. A minimum thickness of 6 inches, or as recommended by the project structural engineer, is recommended if heavy loads are expected. We recommend reinforcing the concrete slab-on-grade floor with No. 3 reinforcing bars spaced at 18 inches on center, or with an alternative reinforcement system as required by the project structural engineer. We recommend that the slab be structurally integrated into the continuous footings with dowels consisting of No. 4 reinforcing bars spaced at 24 inches along the perimeter of the slab. The dowels should extend 40 diameters into the slab, with alternate bars extending an additional 12 inches to avoid a weakened plane at the end of a uniform bar extension into the slab. In general, the reinforcement should be draped or supported by concrete dobies to attain its greatest efficiency in minimizing the cracking of the slabs. Crack control joints should be located as directed by the structural engineer.

Concrete slab-on-grade floors should be underlain by a minimum 4-inch-thick capillary break of pea gravel, clean crushed rock, or Class 2 base rock. If potential moisture vapor transmission through the slab is objectionable, we recommend that an impermeable membrane of 6 mil minimum thickness be placed on the crushed rock and overlain by 2 inches of clean sand to assist in the proper curing of the slab. The membrane is recommended for the office areas, but is optional in other interior slab areas. Some moisture transmission should be expected where a membrane vapor barrier is not utilized. The membrane should be placed in accordance with the manufacturer's specifications. Any punctures or damage to the membrane that may occur must be repaired in accordance with the manufacturer's specifications.

Truck Loading Ramp

We recommend that the ramp slab-on-grade be a minimum thickness of 5 inches. The reinforcing for the ramp slab should be determined by the project structural engineer. The ramp slab should be underlain by a minimum of 6 inches of Caltrans Class 2 aggregate base rock placed on a compacted subgrade. The loading ramp dock walls should be designed as retaining walls, which are discussed below.

Concrete Slab-on-Grade, Miscellaneous Flatwork

1. It is recommended that the exterior slab-on-grade flatwork be a minimum thickness of 4 inches and be structurally independent of the foundation to provide freedom of movement due to soil volume changes.

2. Reinforcement and crack control joints for the concrete slabs shall be as directed by the Project Structural Engineer.

3. We recommend that the exterior slab-on-grade flatwork be underlain by a minimum of 2 to 3 inches of pea gravel, clean crushed rock or Class 2 base rock.

Some vertical displacement of exterior flatwork, sidewalks, driveways, and pavements should be anticipated due to settlement. Proper site drainage, maintenance and controlling landscape irrigation is recommended to reduce the amount of vertical displacement that may occur.

Retaining Walls

Retaining walls should be designed for a drained condition and to resist lateral pressures exerted from soils having an equivalent fluid weight as follows:

RETAINING WALL DESIGN CRITERIA

Gradient of Backfill	Equivalent Fluid Weight (pcf)	Passive Resistance* (pcf)
Level	45	300
3:1 to Level	55	300
Steeper than 3:1 (Maximum 2:1)	60	300

* Commences a minimum of one foot below lowest adjacent grade.

Any retaining wall that is incorporated into the foundation of the building or restrained at the top should be designed with a 100 psf uniform lateral surcharge loading in addition to the lateral earth pressures given above. Parking, storage, or other surcharge loads should also be considered.

The above criteria are applicable for walls less than 10 feet high with fully-drained conditions. We recommend that all retaining walls have a 1/2 inch X 3/4 inch crushed rock or gravel drain blanket with subdrain pipe leading to a suitable discharge area. The granular drain blanket should have a minimum width of 12 inches and extend for the full height and length of the wall, except for a 12-inch compacted soil cover at the surface. A 4-inch diameter perforated rigid drain pipe should be installed in the bottom of the drain rock and below the stem wall cold joint with discharge to a suitable location away from all structural improvements. A geofabric material must be placed around the drain rock.

The drain rock and geofabric material should be approved by the Geotechnical Engineer prior to transporting it to the site.

To reduce the potential for moisture transmission through the retaining wall where the retaining wall is used as part of the building or where moisture transmission would be objectionable, it is recommended that the appropriate face be hot-mopped in accordance with the manufacturer's specifications and an impermeable membrane be placed over the hot-mopped surface to protect the surface from damage during drain rock placement. It is important that surface drainage controls also be installed to reduce the potential for moisture transmission.

Structural retaining walls should be supported upon spread footings in conformance with the recommendations made under the "Foundations" section, except that the minimum footing depth recommended is 12 inches. The retaining wall design should be made by the project structural engineer.

Utility Trenches

Utility trenches that parallel the sides of the building should be placed so that they do not extend below a line sloped down and away at a slope of 2H:1V (horizontal:vertical) from the bottom outside edge of the perimeter foundation.

All trenches should be backfilled with native materials compacted uniformly to the relative compaction specified in Appendix A. If local building codes require use of sand as the trench backfill, all utility trenches entering the building should be provided with an impervious seal of either cohesive soil or lean concrete where the trench passes under the building perimeter. The impervious plug should extend at least 2 feet into and out from the foundation and be a minimum 2 feet in height. Jetting of trench backfill is not recommended as it may result in an unsatisfactory degree of compaction.

Drainage

Surface water must not be allowed to pond adjacent to building foundations. We recommend that roof runoff be controlled and drained into a storm drain system or into closed conduits that lead to acceptable discharge points away from the structure.

Where applicable, a positive slope gradient of 2 percent down and away from the building perimeter should be applied to the finished subgrade for a distance of at least 5 feet. Drainage swales should be provided to remove surface water from the building area.

Plants should not be placed immediately adjacent to the structure. If vegetation must be planted adjacent to the building, plants that require very little moisture should be used. Sprinkler heads should not be placed where they could saturate foundation soil.

Pavements

Portions of the existing paved areas may need to be replaced after construction of the addition and the ramp. Based on the R-value test result and traffic indexes provided by the client, we recommend the following alternative minimum pavement sections:

RECOMMENDED MINIMUM PAVEMENT SECTIONS FOR R-VALUE = 10

Area	Traffic Index	Asphaltic Concrete, in.	Aggregate Base, in.	Aggregate Base Rock, in.
Auto	4.5	2-1/2	8-1/2	---
		3	7-1/4	---
Truck	6.0	3-1/4	12	---
		3-1/4	6	6-3/4
		3-1/2	11-1/2	---
		3-1/2	6	6
Truck	6.5	3-3/4	13-1/4	---
		3-3/4	6	8
		4	12-3/4	---
		4	6	7-1/2

For reinforced concrete pavement areas, we recommend a minimum 5 inches of concrete over a minimum 6 inches of aggregate base. For dumpster loading areas, we recommend a minimum 6-inch concrete slab over 6 inches of aggregate base rock. Reinforcement for concrete pavement should be determined by the Project Structural Engineer.

If the pavement section is to perform to its greatest efficiency, the following criteria are essential for pavement construction:

(a) Remove organic and deleterious materials from all pavement subgrade.

(b) Properly moisture-condition the upper 6 inches of subgrade soil and compact it to a minimum relative compaction of 95 percent at a moisture content of 2 percent over optimum moisture content. Pavement subgrade should be stable with no "pumping" at the time the base rock is placed.

(c) Use only good quality materials of the type and minimum thickness specified. All base rock should meet the Standard Specifications of the State of California for Class 2 base rock and be angular in shape.

(d) Compact the base rock uniformly to a minimum relative compaction of 95 percent.

(e) Place the asphaltic concrete only during periods of fair weather when the free air temperature is within the prescribed limits as set forth by the Asphalt Concrete Institute.

(f) Catch basins in paved areas should have weep holes to allow drainage from adjacent base rock.

Construction During Fall and Winter Seasons

Wet weather may raise the moisture content of the soil well above optimum conditions and earthwork construction may be difficult or impossible. Supplemental recommendations will be provided by the geotechnical engineer in the field, if appropriate.

Miscellaneous

Our site reconnaissance did not reveal the presence of such buried items as underground storage tanks. It is possible, however, that such items may be present. If such items are encountered during the subsurface exploration, grading operations or during the excavations of foundations, our firm should be notified immediately to provide recommendations relative to the proper disposition of these items. Also, this study did not include investigations for toxic and/or corrosive substances or ground water contamination of any type. If such conditions are encountered during the subsurface exploration or site development additional studies should be performed.

Plan Review

Prior to the submission of design drawings and construction documents for approval by the appropriate local agency, copies of these documents should be reviewed by our firm to evaluate whether or not the recommendations contained in this report have been effectively incorporated into the design of the project.

Construction Observations

A representative of this firm should be present during grading and foundation excavation to observe that the work performed is in conformance with specifications and recommendations provided here. We request that you notify us at least 2 working days before the task begins.

LIMITATIONS

This report has been prepared for the exclusive use of the Client and the Client's consultants for specific application to the proposed development. If changes occur in the nature, design, location, or configuration of the proposed development, the conclusions and recommendations contained here shall not be considered valid. Changes must be reviewed by our firm.

The analysis, opinions, conclusions and recommendations submitted in this report are based in part on the referenced materials, site visit and evaluation, and subsurface exploration. The nature and extent of variation among exploratory borings may not become evident until construction. If variations appear, it will be necessary to re-evaluate or revise recommendations made in this report.

The recommendations in this report are contingent on conducting an adequate testing and monitoring program during construction of the proposed development. Unless the construction monitoring and testing program is provided by or coordinated with our firm, PRA will not be held responsible for compliance with design recommendations presented in this report and other supplemental reports submitted as part of this report.

Our services have been provided in accordance with generally accepted geotechnical engineering practices. No warranties are made, express or implied, as to the professional opinions or advice provided. Recommendations contained in this report are valid for a period of one year; after one year they must be reviewed by this firm to determine whether or not they still apply.

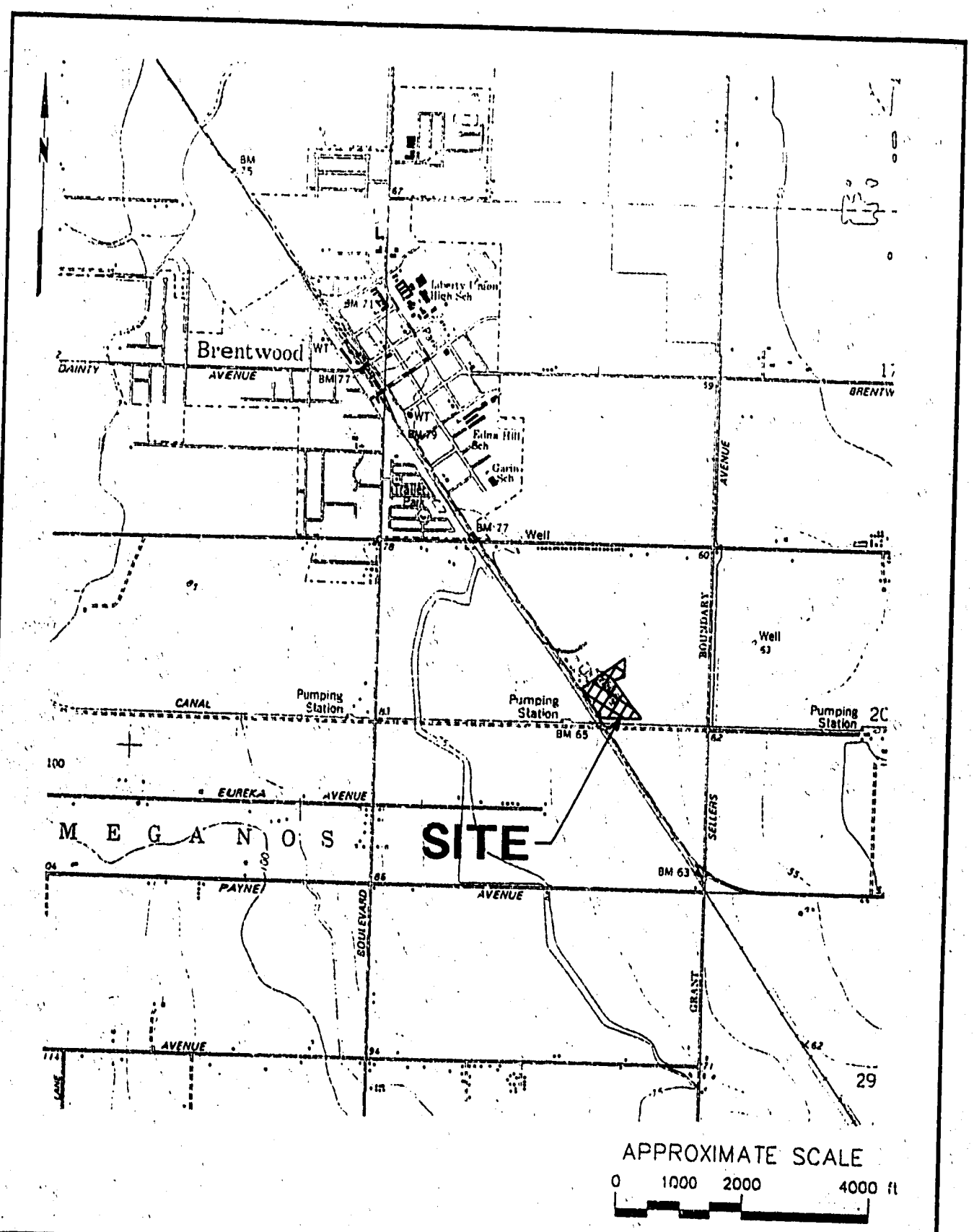
REFERENCES

Atwater, B.F., 1982, "Geologic Maps of the Sacramento - San Joaquin Delta, California," United States Geological Survey, MF-1401.

Contra Costa County Planning Department, "Seismic Safety Element," 1975, Revised 1986.

Dibblee, T.W. "Preliminary Geologic Map of the Brentwood Quadrangle, Contra Costa County, California," US Geological Survey, 1980

US Geological Survey, 1978, "Brentwood Quadrangle, Contra Costa County, California, 7.5 Minute Series (topographic)."



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NOTES

BASE MAP FROM USGS, BRENTWOOD, CALIFORNIA, 7-1/2 MINUTE TOPOGRAPHIC QUADRANGLE, 1978.

DATE	MARCH 1994
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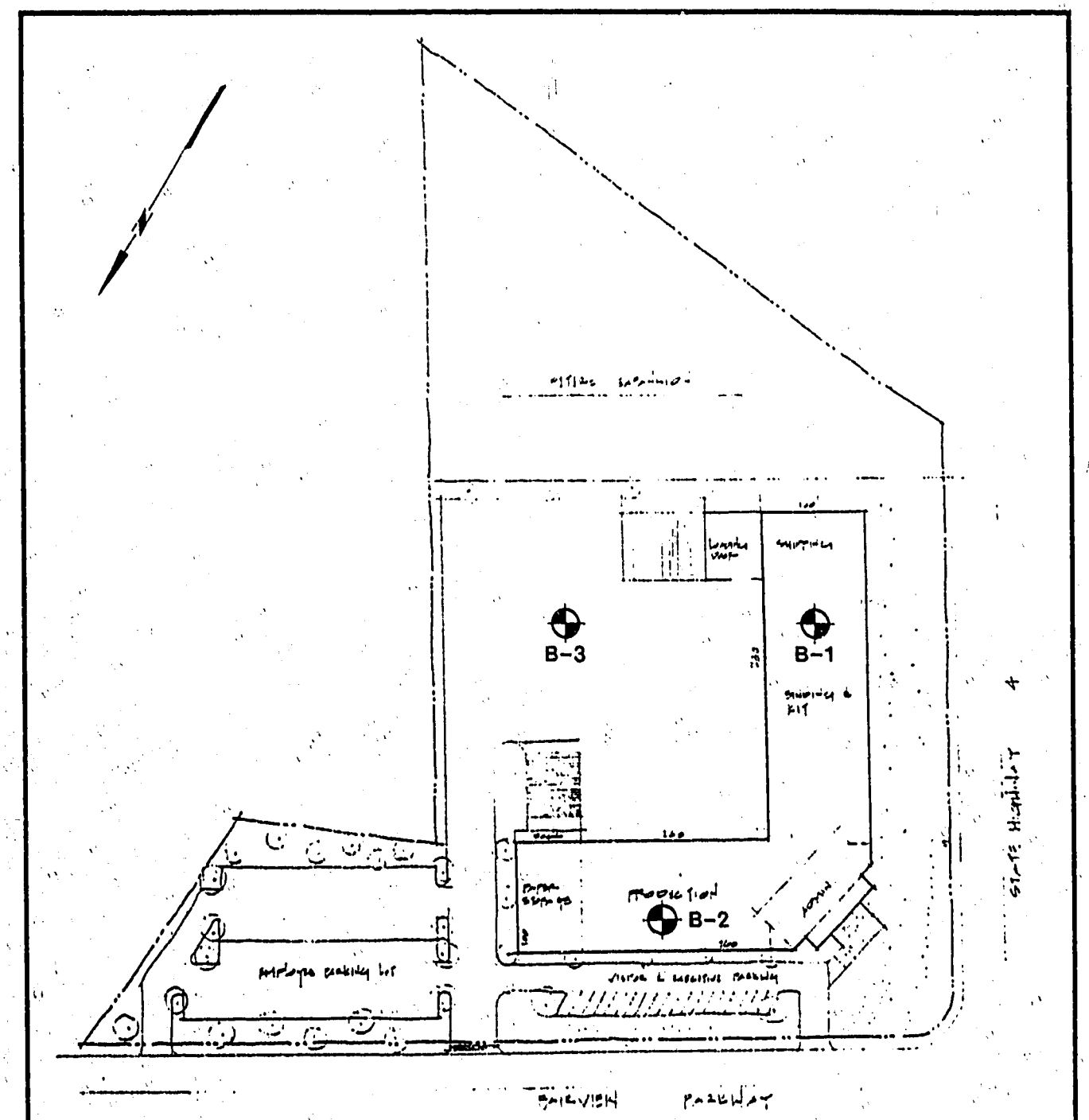
DWG NO.	65090101
DRAWN	DTF
CHK'D	JJA
APP'D	DJR

Furcell, Rhoades & Associates
Consultants in the Applied Earth Sciences

SITE LOCATION MAP
SE CORNER OF FAIRVIEW PARKWAY & STATE HIGHWAY 4
BRENTWOOD, CALIFORNIA
UNICOPY

FIGURE NO. 1

REV NO.



EXPLANATION

B-1 APPROXIMATE LOCATION OF EXPLORATORY BORING

APPROXIMATE SCALE:

0 130 260 ft

NOTES

PROPOSED SITE PLAN PROVIDED BY CLIENT, DATED JANUARY 7, 1994.

DATE	MARCH 1994
JOB NO.	6509-01
DWG NO.	65090102
DRAWN	DTF
CHK'D	JJA
APP'D	DJR

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SITE PLAN
SE CORNER OF FAIRVIEW PARKWAY & STATE HIGHWAY 4
BRENTWOOD, CALIFORNIA
UNICOPY

FIGURE NO. 2

REV NO.

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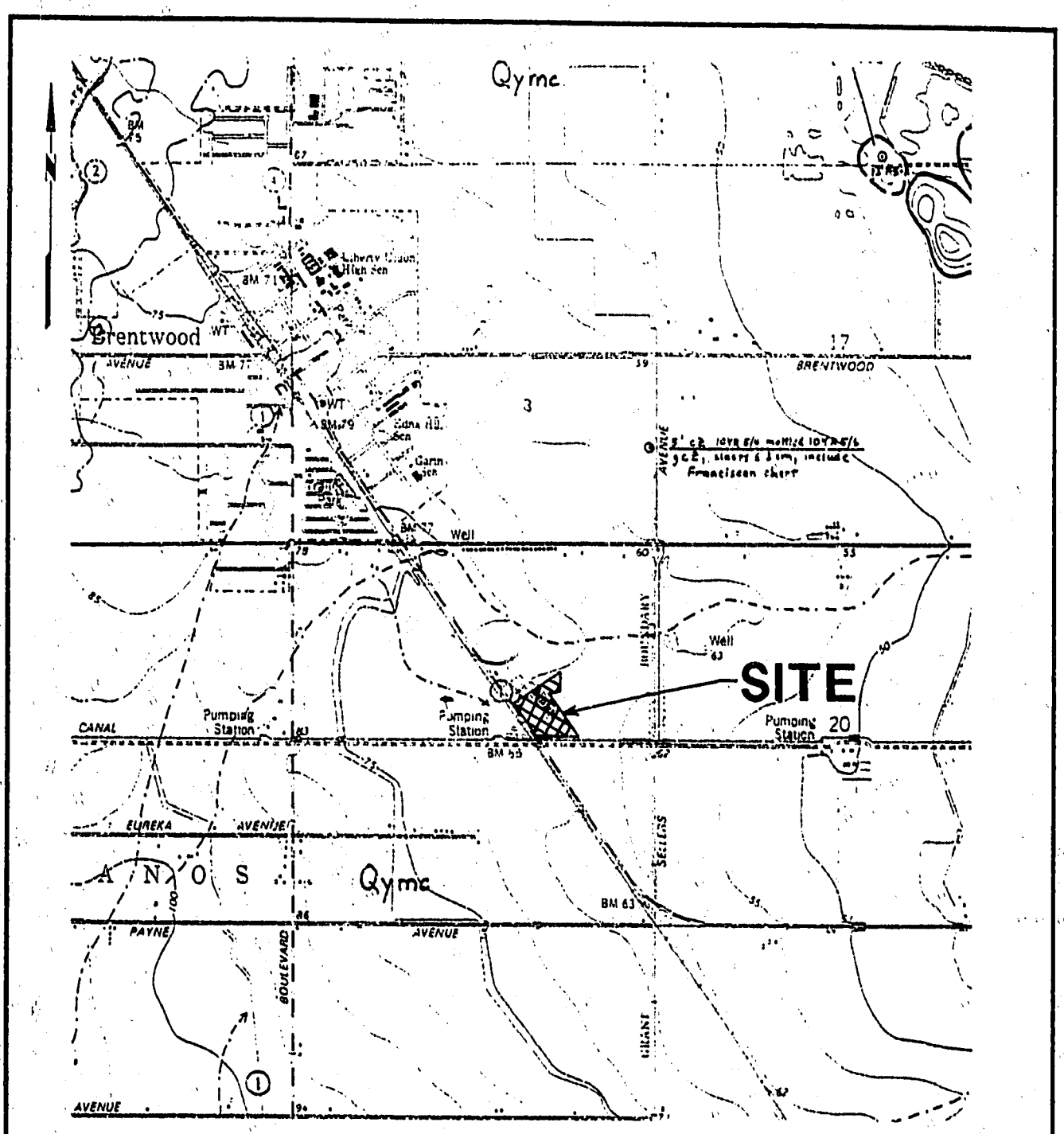

EXPLANATION

Qymc – ALLUVIUM OF MARSH CREEK AND VICINITY (HOLOCENE AND UPPER PLEISTOCENE)

① – CENTERLINE OR EDGE OF WATERWAY SUBJECT CHIEFLY OR WHOLLY TO NON-TIDAL FLOW. ARROWS GIVE PROBABLE DIRECTION OF FLOW. DASHED WHERE LOCATION MAY ERR BY MORE THAN 1500 FT. CIRCLED NUMBERS DENOTE RELATIVE AGES OF WATERWAYS. (1) OLDER AND (2) YOUNGER.

APPROXIMATE SCALE

0 1000 2000 4000 ft

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NOTES

GEOLOGIC MAP BY ATWATER, BRIAN F., 1982, "GEOLOGIC MAPS OF THE SACRAMENTO-SAN JOAQUIN DELTA, CALIFORNIA," USGS MISCELLANEOUS FIELD STUDIES MAP MF-1401.

DATE	MARCH 1994
JOB NO	6509-01
DWG NO	65090103
DRAWN	DTF
CHK'D	JJA
APP'D	DJR

Purcell, Rhoades & Associates
Consultants in the Applied Earth Sciences

GEOLOGIC MAP
SE CORNER OF FAIRVIEW PARKWAY & STATE HIGHWAY 4
BRENTWOOD, CALIFORNIA

FIGURE NO. 3

UNICOPY

REV NO.

EXPLORATORY BORING LOG

CLIENT: Unicopy LOCATION: SE of Fairview Parkway and Highway 4, Brentwood, California	JOB NO: 6509-01 DATE: 2/16/94	BORING B - 1
DRILL RIG: DRILLER: Soil Exploration Services WT. OF HAMMER/DROP: 140 pounds/30 inches	BORING ELEV.: Existing Grade BORING DIAM.: 8-inch LOGGED BY: MDM	PAGE 1 OF 1

MATERIAL DESCRIPTION AND REMARKS	CONSISTENCY	USCS	DEPTH (ft.)	SHPL	N blows per ft.	DRY DENSITY (pcf)	WATER CONTENT (%)	PLASTICITY INDEX (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Sandy SILT: dark brown, very moist	MED STIFF	ML	1						
Silty CLAY: medium brown, moist	STIFF TO VERY STIFF	CL	2		9 15				
			3						
			4						
			5						
			6		13 14				
			7						
			8						
			9						
becomes very moist and plastic			10						
			11		5 7				
			12						
			13						
			14						
			15						
			16		3 4				
			17						
			18						
			19						
			20						
			21						
			22		2 4				
			23						
			24						
			25						
			26		8 9				
Boring terminated at 26.5 feet depth. Water encountered at 23 feet depth. Boring backfilled with grout.									

PURCELL, RHOADES & ASSOCIATES Consultants in the Applied Earth Sciences	EXPLORATORY BORING LOG B-1 SE OF FAIRVIEW PARKWAY AND HIGHWAY 4 BRENTWOOD, CALIFORNIA UNICOPY	FIGURE NO. 4

EXPLORATORY BORING LOG

CLIENT: Unicopy LOCATION: SE of Fairview Parkway and Highway 4, Brentwood, California	JOB NO: 6509-01 DATE: 2/16/94	BORING B - 2
DRILL RIG: DRILLER: Soil Exploration Services WT. OF HAMMER/DROP: 140 pounds/30 inches	BORING ELEV.: Existing Grade BORING DIAM.: 8-inch LOGGED BY: MDM	PAGE 1 OF 1

MATERIAL DESCRIPTION AND REMARKS	CONSISTENCY	USCS	DEPTH (ft.)	SMPL	N blows per ft.	DRY DENSITY (pcf)	WATER CONTENT (%)	PLASTICITY INDEX (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Sandy GRAVEL: medium brown, moist.	Medium Dense	GP-ML	1						
Clayey Silt: brown, moist.	Stiff	CL	2		8				
Sandy CLAY: light brown, moist.	Stiff		3		10				
			4						
			5						
			6		8				
			7		11				
			8						
			9						
			10						
Clayey SAND: light brown, fine-grained, slightly moist.	Medium Dense	SP	11		5 7				
			12						
			13		SPT 4				
Silty CLAY: light brown, moist.	Stiff	CL	14		6				
			15						
			16		4				
			17		3				
			18						
			19						
			20						
			21		3				
			22		5				
			23						
			24						
			25						
			26						

PURCELL, RHOADES & ASSOCIATES Consultants in the Applied Earth Sciences	EXPLORATORY BORING LOG B-3 SE OF FAIRVIEW PARKWAY AND HIGHWAY 4 BRENTWOOD, CALIFORNIA UNICOPY	FIGURE NO. 5

EXPLORATORY BORING LOG

CLIENT: Unicopy LOCATION: SE of Fairview Parkway and Highway 4 Brentwood California	JOB NO: 6509-01 DATE: 2/16/94	BORING B - 2
DRILL RIG: DRILLER: Soil Exploration Services WT. OF HAMMER/DROP: 140 pounds/30 inches	BORING ELEV.: Existing Grade BORING DIAM.: LOGGED BY: MDM	PAGE 2 OF 2

MATERIAL DESCRIPTION AND REMARKS	CONSISTENCY	USCS	DEPTH (ft.)	SMPL	N blows per ft.	DRY DENSITY (pcf)	WATER CONTENT (%)	PLASTICITY INDEX (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Clayey SAND: medium brown medium grained, moist.	Dense	SC	26		15				
		SM			17				
	Loose to Medium Dense		27		SPT 4 5				
Grades to silty sand: brown fine grained, wet.			28						
			29						
			30						
			31		SPT 3 5				
			32						
			33						
			34						
			35		SPT 4				
			36		6				
			37						
			38						
			39						
			40						
Silty CLAY: light brown, moist.	Stiff		41		SPT 4 7				
Boring Terminated at 41.5 feet. Water encountered at 21 feet. Boring backfilled with grout.			42						
			43						
			44						
			45						
			46						
			47						
			48						
			49						
			50						

PURCELL, RHOADES & ASSOCIATES Consultants in the Applied Earth Sciences	EXPLORATORY BORING LOG B-2 SE OF FAIRVIEW PARKWAY AND HIGHWAY 4 BRENTWOOD, CALIFORNIA UNICOPY	FIGURE NO. 5

EXPLORATORY BORING LOG

CLIENT: Unicopy
LOCATION: SE of Fairview Parkway and Highway 4, Brentwood, California

JOB NO: 6509-01
DATE: 2/16/94

BORING B - 3

DRILL RIG:
DRILLER: Soil Exploration Services
WT. OF HAMMER/DROP: 140 pounds/30 inches

BORING ELEV.: Existing Grade
BORING DIAM.: 8-inch
LOGGED BY: MDM

PAGE 1 OF 1

MATERIAL DESCRIPTION AND REMARKS	CONSISTENCY	USCS	DEPTH (ft.)	SMPL	N blows per ft.	DRY DENSITY (pcf)	WATER CONTENT (%)	PLASTICITY INDEX (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Sandy SILT: dark brown, moist.	Medium Stiff	ML	1						
Silty CLAY: medium brown, moist.	Stiff to very Stiff	CL	2		6				
			3		11				
			4						
			5						
			6		7				
Silty SAND: light brown, moist.	Medium Dense	SP	7		7				
					SPT				
		CL			5				
Silty CLAY: medium brown, moist.	Stiff		8		7				
			9						
			10						
			11		6				
					8				
Boring Terminated at 11.5 feet. Water not encountered. Boring backfilled with grout.			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						
			21						
			22						
			23						
			24						
			25						
			26						

PURCELL, RHOADES & ASSOCIATES
Consultants in the Applied Earth Sciences

EXPLORATORY BORING LOG B-3
SE OF FAIRVIEW PARKWAY AND HIGHWAY 4
BRENTWOOD, CALIFORNIA
UNICOPY

FIGURE NO. 6

APPENDIX A

RECOMMENDED GRADING SPECIFICATIONS

FOR
PROPOSED COMMERCIAL BUILDING
APN 101-160-015
SE CORNER OF FAIRVIEW PARKWAY AND HIGHWAY 4
BRENTWOOD, CALIFORNIA
FOR
UNICOPY, INC.

APPENDIX A

RECOMMENDED GRADING SPECIFICATIONS

For
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APN 101-160-015
SE CORNER OF FAIRWIEW PARKWAY AND HIGHWAY 4
BRENTWOOD, CALIFORNIA

FOR
UNICOPY, INC.

1. General

1.1 These Recommended Grading Specifications (called "Specifications" here) provide general guidelines for soil engineering aspects of grading for the subject development. The Geotechnical Engineer from Purcell, Rhoades & Associates should be consulted prior to any site work connected with grading. Please refer to the following report for other grading recommendations supporting these Specifications.

Purcell, Rhoades & Associates, March 11, 1994, "Geotechnical Study, Proposed Commercial Building, SE Corner of Fairview Parkway and Highway 4, Brentwood, California.

1.2 These Specifications include the following:

- clearing, stripping, grubbing, and preparing areas to be filled
- selecting materials for fill
- placing, spreading, and compacting fill
- completing subsidiary work necessary to conform to lines, grades, and slopes shown on accepted plans
- protecting the soil in slab and foundation areas from drying out between grading and construction

1.3 Tests and observations shall be made by a representative from Purcell, Rhoades & Associates during the grading so that we can confirm that grading was performed according to these Specifications. Such confirmation in a final grading report is often required to obtain a building permit.

1.4 Purcell, Rhoades & Associates shall be notified at least 2 working days prior to placement of fill so arrangements for testing and observation may be made.

1.5 Grading or placement of fill done without the presence of a representative of Purcell, Rhoades & Associates or without prior coordination between Purcell, Rhoades & Associates and the grading contractor shall be at the contractor's risk; Purcell, Rhoades & Associates will accept no responsibility for such work.

2. Testing

2.1 The American Society for Testing and Materials (ASTM) Test Procedure D 1557 shall be the standard test to define maximum densities for all compaction of fill. All densities shall be expressed as relative compaction in terms of the maximum dry density obtained in the laboratory by the foregoing standard procedure.

2.2 Field density tests shall be performed according to ASTM Test Procedures D 2922-81 and D 3017-88. The locations and number of field density tests shall be selected by the Geotechnical Engineer.

3. Clearing, Stripping, Grubbing, and Preparing of Areas to Be Filled

3.1 Trees, roots, vegetation, and organic surficial soil shall be removed from structural areas unless specified otherwise by Purcell, Rhoades & Associates.

3.2 Strippings are defined as surface vegetation and organic surficial soil. Strippings may not be used in fill unless specifically authorized and observed by the Geotechnical Engineer. Stripping may be stockpiled for landscaping use, with the approval of the landscape architect.

3.3 Soil deemed soft or unsuitable by the Geotechnical Engineer shall be removed. Loose fills and surface soil sloughs shall also be excavated.

3.4 Underground structures such as old foundations, abandoned pipelines, septic tanks, and leach fields shall be removed from the site.

3.5 The final stripping and excavation shall be approved by the Geotechnical Engineer before further grading is started.

3.6 The original ground on which the fill, foundation or slabs are to be placed shall be plowed or scarified at least 8 inches and until the surface is free from ruts, hummocks or uneven features which would tend to prevent compaction.

3.7 The native subgrade soil or subexcavated subgrade to receive fill shall be moisture-conditioned and compacted to the requirements specified in the referenced report and below:

Minimum relative compaction: 90 percent
Minimum moisture content: 2 percent over optimum

Pavement subgrade and base rock shall be moisture-conditioned and compacted to the requirements specified in the referenced report and below:

Minimum relative compaction: 95 percent
Minimum moisture content: 2 percent over optimum

4. Selecting Fill

4.1 The Geotechnical Engineer or the Engineer's Representative shall evaluate suitability of materials for compacted fills. The material shall be a soil or soil-rock mixture, free of organic matter or other deleterious substances. Within 3 feet of finished grade, the compacted fill shall contain no rocks or lumps over 6 inches in diameter and none that are more than 15 percent larger than 2-1/2 inches. Rocks greater than 6 inches in diameter shall be placed in deep fills as approved by the Geotechnical Engineer or the Engineer's Representative so that they are not nested and so compaction may be achieved around them.

4.2 If imported materials are needed, they must be approved by the Geotechnical Engineer or the Engineer's Representative prior to transporting the fill to the project. Unless otherwise exempted by the Geotechnical Engineer, they should meet the following requirements:

1. The plasticity index shall not exceed 15.
2. No rocks shall exceed 6 inches in diameter.

5. Placing, Spreading, and Compacting Fill

5.1 The fill shall be placed in uniform lifts of not more than 8 inches in uncompacted thickness. Each layer shall be spread evenly and shall be thoroughly blade mixed during spreading to obtain uniformity of material. Before compaction begins, the fill shall be brought to a water content (as directed by the Geotechnical Engineer or the Engineer's Representative) that will permit proper compaction by either (1) aerating the material if it is too wet or (2) spraying the material with water if it is too dry.

5.2 After each layer has been placed, mixed, and spread evenly, it shall be compacted as specified in the referenced report and below:

Minimum relative compaction: 90 percent
Minimum moisture content: 2 percent over optimum

Subexcavation and recompaction within the building area (plus 5 feet outside the perimeter) shall be moisture conditioned and compacted to between 88 and 92 percent relative compaction at a minimum of 4 percent over optimum moisture content. The depth of subexcavation will be determined by the Geotechnical Engineer or his representative during grading.

5.3 The contractor shall use appropriate equipment to compact the fill to the specified density. Compacting shall be performed while the fill is within the specified range of moisture content. Each layer shall be compacted over its entire area, and the compacting equipment shall make enough passes to achieve the required density.

5.4 Fill placed on slopes shall be compacted by means of suitable equipment. Benching of the slopes should be done in increments of 3 to 5 feet in height until the fill is brought to its specified height or as determined by the Geotechnical Engineer or the Engineer's Representative.

5.5 When sheepsfoot rollers are used for compaction, the density tests shall be taken in the compacted material below the surface disturbed by the roller. When these tests indicate that the density of any layer of fill, or portion thereof, is below the required density, it shall be reworked until the required compaction has been obtained.

5.6 Soil shall not be placed or compacted during periods of rain or on ground which is not drained of water. Soil which has been moistened by rain or other cause shall not be compacted until the moisture content is within the limits specified in the referenced report. Prior approval by the Geotechnical Engineer or the Engineer's Representative shall be obtained before continuing grading.

6. Backfilling Trenches

6.1 Geologic exploratory trenches (or other depressions), if any, within the proposed building or pavement areas, shall be re-excavated and backfilled to meet the requirements for compacted fill, as specified above.

6.2 All trenches shall be backfilled with native materials compacted uniformly to the relative compaction specified in Appendix A. If local building codes require use of sand as the trench backfill, all utility trenches entering the building shall be provided with an impervious seal of either cohesive soil or lean concrete where the trench passes under the building perimeter. The impervious plug should extend at least 2 feet into and out of the foundation and be a minimum 2 feet in height. Jetting of trench backfill is not recommended as it may result in an unsatisfactory degree of compaction.

7. Removing Subsurface Pipes

7.1 The Geotechnical Engineer or Engineer's Representative shall designate the methods of removal of subsurface pipes. Depending upon depth and location, one of the following methods shall be specified:

- The pipe shall be removed, and the trench shall be filled and compacted according to applicable requirements for compacting native soil (Section 3) or fill (Section 5).
- The pipe shall be crushed in the trench, and the trench shall be filled and compacted according to applicable portions of Sections 3 and 5.
- The ends of the pipes shall be capped with concrete to prevent entrance of water. The length of the cap shall be at least 5 feet.

7.2 Any existing wells on the site shall be filled, buried and capped according to the requirements of the local regulatory agency. The final elevation of the top of the well casing shall be a minimum of 36 inches below any adjacent grade at the completion of grading or filling. Under no circumstances should structural foundations be placed over the capped wells.

8. Grading Slopes

8.1 Slopes shall be graded at gradients no steeper than 2:1 (horizontal to vertical) for fill and cut, except as noted in the referenced report.

8.2 After the slopes have been graded, they shall be track-rolled, and provisions shall be made for planting the slopes for erosion control. Drainage facilities shall be constructed to prevent water from flowing over slopes. No slope shall be left to stand through a winter season without erosion control.

9. Installing Subdrains

9.1 For subdrains, the contractor shall provide and install perforated pipe Standard Designation Ratio (SDR) 23.5 or equivalent approved by the Geotechnical Engineer or the Engineer's Representative and filter material for subdrains as shown on the plans or as recommended by the Purcell, Rhoades & Associates The following restrictions apply:

9.1.1 Clay drain tile, concrete drain tile and perforated clay pipe shall not be permitted. Use no wyes, tees, or other joints of these materials.

9.1.2 Porous concrete pipe, perforated asbestos-cement pipe, bituminous fiber or pipe of other materials shall be permitted only on written authorization of the Geotechnical Engineer.

9.1.3 The contractor shall use 1/2 by 3/4 inch drain rock wrapped within a filter fabric approved by our Geotechnical Engineer, unless otherwise permitted by written authorization from the Geotechnical Engineer.

9.1.4 Unless recommended otherwise by the Geotechnical Engineer or the Engineer's Representative, the contractor shall use pipes not less than 4 inches in diameter for lateral drains up to 50 feet in length. Use pipes of not less than 6 inches in diameter for lateral drains greater than 50 feet in length. Larger minimum pipe diameters may be specified by the Geotechnical Engineer or the Engineer's Representative during construction.

10. Unusual Conditions

10.1 If unusual conditions occur during grading, the Geotechnical Engineer shall be immediately notified for recommendations.

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